Retrofitting Bridges Prevents Catastrophic Failure and Saves Millions

Full Mitigation Best Practice Story

Conecuh County, Alabama

Conecuh County, AL - Conecuh County Engineer, Winston Foshee, knew that without preventive action the County was facing the potential for failure of seven bridges. Working with the Alabama Emergency Management Agency (AEMA), Conecuh County received Hazard Mitigation Grant Program (HMGP) funding to retrofit seven bridge sites and add a new bridge to reduce road damages and improve public safety.

The steel support pilings at seven bridge sites in Conecuh County were exposed due to streambed scouring. Exposure of the pilings had caused corrosion and weakened the pilings. Each year, and with each flood event, the loss of material and increased scour was leading towards bridge failures. To strengthen the pilings on the bridge spans, the existing concrete encasements around the steel piles were extended to encase the exposed pilings. Filter fabric and riprap were also placed around the encasements to protect the streambed from continued scour that would expose more steel piling. The work was performed by the county as an in-kind contribution. Thus, the HGMP funds were solely utilized for material expenses. This approach allowed the county to accomplish more with less funding.

It was estimated that failure of each bridge span would have required the replacement of 150 feet bridge span per site at an approximate cost of $300,000 per bridge, for a total cost over $2.1 million. In contrast, retrofit to the pilings and riprap for all seven sites had a cost of $86,000 and extended each bridge spans' useful life another 30 years. Following Hurricane Ivan, it appears the piling retrofits were successful at stopping the problem and, as Foshee describes it, allows each bridge span to "help heal itself."

In another project, just south of the community of Nymph, an inadequate culvert was replaced with a 40 foot steel and timber bridge span. Repetitive damages due to the inadequate culvert had begun in the early 1990s. Damage occurred during a flood in 1990, Hurricane Opal in 1995, and a spring flood and Hurricane Georges in 1998. For example, the spring flood of 1998 caused $9,000 in road damages, trapped the 900 area residents, and prevented direct fire and rescue services to the southern part of Conecuh County. The $20,000 replacement span was sized for the drainage area, eliminating road damage, and providing safe passage in and out of the area during flood events.

Hurricane Ivan represented a small test of these mitigation measures, as floodwaters did not exceed record levels in Conecuh County. Both projects, however, were designed to address problems that had accumulated over time from repetitive, small events. By having these mitigation measures in place, there was no accumulation of damages to the bridges from Hurricane Ivan.

Activity/Project Location	
Geographical Area:	**Single County (County-wide)**
FEMA Region:	**Region IV**
State:	**Alabama**
County:	**Conecuh County**

Key Activity/Project Information

Sector:	**Public**
Hazard Type:	**Severe Storm**
Activity/Project Type:	**Retrofitting, Structural**
Activity/Project Start Date:	**01/2002**
Activity/Project End Date:	**01/2003**
Funding Source:	**Hazard Mitigation Grant Program (HMGP)**
Funding Recipient:	**Local Government**
Funding Recipient Name:	**Conecuh County**

Activity/Project Economic Analysis

Cost:	**$86,000.00 (Estimated)**

Activity/Project Disaster Information

Mitigation Resulted From Federal Disaster?	**Unknown**
Value Tested By Disaster?	**Yes**
Tested By Federal Disaster #:	**No Federal Disaster specified**
Year First Tested:	**2004**
Repetitive Loss Property?	**No**

Reference URLs

Reference URL 1:	**http://www.riversofalabama.org/Conecuh/CON_Tributaries.htm**
Reference URL 2:	**http://www.fema.gov/about/divisions/mitigation/mitigation.shtm**

Main Points

- Steel support pilings installed at seven bridge sites to protect from corrosion and scour.
- Inadequate culvert was replaced with a 40 foot steel and timber bridge span.
- Conecuh provided the labor and FEMA paid for materials to retrofit bridges, saving over $2 million in replacement costs and preventing a potentially catastrophic failure.